

metric scale to show the smaller undulations. These are really the most important ones, as they often occur during fine weather when the storm may be hundreds of miles distant. Then again I have found ordinary observers allow too much friction between the pen and paper, and often do not keep the pen point as fine as it should be. For this and many other reasons I have made a strong plea for the universal introduction of extra sensitive barographs with open scale, and teach those in charge the true value of these minute undulations. I find these secondary tidal undulations beautifully recorded upon the Esquimaux gauge sheets, and now that my large hydro-aerograph has arrived I hope to make a minute study of this phenomenon in the Victoria Harbor.

METEOROLOGICAL REPORTS BY CABLE FROM ICELAND.

In 1880 Hoffmeyer gave utterance to the oft expressed conviction of many meteorologists that daily telegraphic reports from Iceland would be of inestimable value in weather predictions for Great Britain and northern Europe. This subject has been favorably reported upon several times by the International Meteorological Committees and Congresses (Berne, 1880; Copenhagen, 1882; Munich, 1891; etc.) The commercial intercourse with Iceland would, however, evidently not pay the interest on the cost of the cable, and it is only quite lately that the Danish meteorologists have received from business men a proposition that makes the project seem at all feasible.

The "Grande Compagnie des Télégraphes du Nord," having its center at Copenhagen, calculates that the expense of the installation of the cable from Shetland, touching the Faroe Islands and ending at Iceland, together with the land lines will be \$600,000, and that an annual payment of \$36,000 for twenty-eight years would liquidate this debt. The maintenance of the cable and stations adds \$32,000, so that an annual revenue of \$68,000 must be provided for.

The above-mentioned telegraph company will undertake to build and to maintain the line if it is guaranteed this annual revenue for the first twenty years only. The Government of Denmark and Iceland will establish and maintain the meteorological stations and the expense of daily telegraphic bulletins, and will perform the hydrographic work necessary in connection with the laying of the cable, and will also guarantee an annual subvention of \$25,000 for twenty years. Therefore, all that now remains to be done in order to secure telegraphic communication with Iceland for commercial and meteorological purposes is to secure the remaining annual income of \$41,000. It is hoped and believed that a large portion and perhaps all of this may be secured by national legislation in the States of Europe and America that are interested in this subject. The sums required from each of these would scarcely amount to the salary of one or two employees, and would be abundantly counterbalanced by the increase in our knowledge of the atmosphere and our ability to make predictions of storms and cold waves.

There is, in fact, no reason why the larger newspapers of the world should not also add their contributions as the news items will, of course, have a commercial value.

At present American meteorological services seem to be deeply interested in extending their own systems north, west, and south, rather than eastward.

THE INTERNATIONAL METEOROLOGICAL COMMITTEE.

The next meeting of the International Meteorological Committee has been called for the 25th of August, 1899, at St. Petersburg. The following are the members of the committee as selected by the International Conference, Paris, September, 1896. (See MONTHLY WEATHER REVIEW, October, 1896, p. 367):

E. Mascart, France, *President*.
Robert H. Scott, Great Britain, *Secretary*.
W. V. Bezold, Germany.
R. Billwiller, Switzerland.
J. de Brito-Capello, Portugal.
Walter R. Davis, Argentine Republic.
John Eliot, India.
Julius Hann, Austria.
Stefano Hérites, Roumania.
H. H. Hildebrandsson, Sweden.
H. Mohn, Norway.
Willis L. Moore, United States.
Adam Paulsen, Denmark.
H. C. Russell, New South Wales.
M. Rykatcheff, Russia.
M. Snellen, Russia.
P. Tacchini, Italy.

Vacancies occasioned by death or resignation may be filled by the committee. The committee may also invite others to take part in its discussions.

Besides this general International Committee there were several special committees appointed by the International Conference, such as the subcommittee on international telegraph service; the subcommittee on terrestrial magnetism and atmospheric electricity, whose last meeting was held at Bristol, England, August, 1898; the subcommittee on instruments and methods of observation; the subcommittee on clouds, under whose initiative a special work on this subject was conducted during the year July, 1897-98; the subcommittee on aeronautics, whose meeting at Strasburg in 1898 was reported upon by Mr. A. L. Rotch in the MONTHLY WEATHER REVIEW for April, 1898, p. 158.

The reports of these subcommittees and the questions thus far proposed for discussion by individual meteorologists are embodied in the following provisional program of the meeting to be held at St. Petersburg. This meeting of the General Committee will, also, undoubtedly, designate the time and place of the next general conference.

1. Report of M. Rücker on terrestrial magnetism and atmospheric electricity.
2. Report of M. Hildebrandsson on clouds.
3. Report of M. Hergesell on balloon ascensions.
4. Report of M. Violle on radiation and insolation.
5. Rykatcheff.—Is it desirable that the committee should occupy itself with observations of earthquakes?
6. von Bezold.—Antarctic explorations.
7. Hildebrandsson.—The centers of action of the atmosphere.
8. Rykatcheff.—Definition of the meteorological day.
9. Rykatcheff.—Instructions for the use of sunshine recorders.
10. Rykatcheff.—Rules for the determination of soil temperatures.
11. Rykatcheff.—Precautions to be taken in using alcohol thermometers.
12. Rykatcheff.—Symbol to be employed for designating low fog.
13. Rykatcheff.—Define the meaning of the symbols employed to designate storms.
14. von Bezold.—Protection of magnetic observatories against industrial electrical works.
15. Hann.—Proposition for the publication in a special form of the tables of the diurnal range of temperature in each country.
16. Hann.—Importance of actinometric observations.
17. Teisserenc de Bort.—Installation of anemometers.
18. Teisserenc de Bort.—Employment of carrier pigeons by the transatlantic steamers for conveying information as to the weather west of Europe.
19. Date of the next International Conference.

METEOROLOGY IN RUSSIA.

On the 13th of April, 1899 (April 2, according to the old style calendar as used in Russia), the Central Physical Observatory in St. Petersburg celebrates the fiftieth anniversary of its foundation. This will be made a notable festival occasion. The Czar and many of the highest dignitaries in diplo-

matic and scientific circles will probably be present; congratulations will be received and honors conferred, and nothing that can add to the brilliancy of the celebration will be neglected.

It is a pleasure to call attention to this renewed evidence of the high position occupied by meteorology in the Russian Empire.

Fifty years ago our branch of science was known as the youngest of all. In those days Humboldt, Dove, Sabine, Glaisher, Quetelet, Leverrier, Kämtz, Kupffer, Espy, Redfield, Reid and Piddington, Loomis and Henry had only lately begun the long series of studies that have culminated in the modern weather bureau and the daily weather map. The science that was born with Galileo, and was fostered by Newton, d'Alembert, Euler, and Laplace, attracted much attention by the middle of the nineteenth century and soon demonstrated its value to mankind and the necessity of its further development. Two centuries had been spent in accumulating meteorological and climatological data before we began to understand some of the mechanical principles that the atmosphere must obey. Now, every year adds to our knowledge of the physics of the atmosphere. While government weather bureaus everywhere cultivate climatology, properly so-called, they are also studying the physical and mechanical problems relative to the motions of the atmosphere, or dynamic meteorology. By common consent the problems of terrestrial magnetism are also at present included in the work of many government weather bureaus, as having a possible but very problematic bearing on atmospheric phenomena. This wide range of studies has been brilliantly cultivated by the labors of the officials of the Central Physical Observatory of Russia. The history of this institution is the history of meteorology in Russia and it is proper to recall some of the phases of this history and some of the prominent scientists.

In 1702-3 Peter the Great wrested the lands about the river Neva from the hands of the Swedes and Finns and on May 16, O. S. (May 27, N. S.), began the erection of the fortress about which St. Petersburg has grown. On January 11/22, 1718, Peter the Great issued a decree ordering that an academy of science should be established and the details of this organization were further elaborated in a decree of January 20/31, 1724, published about a year before his death on January 28/February 8, 1725. The academy is still located in the building then erected for it on Vasili-Ostroff; it originally consisted of ten members, which number is now considerably increased; its object is to provide for the advancement of science, for public scientific lectures and meetings, for scientific instruction in the universities and for the proper conduct of various branches of scientific work fostered by the government as being essential to the public welfare. The original ten members were largely chosen from prominent scientific men in the other States of Europe, especially France, Germany, and Switzerland. One of them, Captain Behring, belonging to the Baltic Province of Jutland, was appointed a member while he was still away on his great voyage of exploration to Behring Sea, during the years 1725-1728. The plans of Peter the Great were further advanced by the Empress Catherine I. Among the earliest academicians were Nicholas and Daniel Bernoulli of Bern and Berlin, Herman of Basle, Goldbach of Königsberg, Delisle of Paris, Leonard Euler of Berlin. The first public session was held December 27 (N. S., January 7, 1726).

The organization of European academies of science differs generally from that of similar organizations in America, in that the academicians are appointed by high government authority. They are responsible for carrying out the scientific work of the government. They are not merely students and advisers, but directors of large enterprises. They are expected to exert a powerful influence upon the general development of science in the nation.

In addition to the St. Petersburg Academy, which dates from 1725, we must recognize several other institutions in Russia that have done good work for meteorology. First of all we must mention the Russian Navy, or the so-called Admiralty Office, which has been distinguished since the days of Behring, who entered it in 1704, until the present time, when Rykatcheff represents the highest development of meteorological science. We must mention the Free Economical Society of Russia, which was organized in 1765. This is independent of the Government. The word *free* is used in the same sense as in the case of the Free Church of Scotland. This society has devoted itself largely to the interests of agriculture, and has assisted in the study of climatology. The fourth organization to be mentioned is the Imperial Russian Geographical Society, which dates from 1845. At first climatology was considered as a minor and incidental matter in the transactions of this society, but of late years, under the influence of Woeikoff, Klossoffsky, and Tillo, it has done much to develop the study of thunderstorms, magnetism, and the whole range of terrestrial physics.

But most important of all in the highest interests of science has been the influence of the noble university at Dorpat. Some account of this university and its relations to Russian astronomy was prepared by the present Editor for publication in the Annual Report of the Smithsonian Institution for 1867. This university was founded by the Emperor Alexander I by a decree dated December 12/24, 1802, and permanently restored to Dorpat the prominence and importance that that place had held for twelve hundred years. To this university science is indebted for many most prominent names. To Prof. F. G. Parrot, the elder, astronomy owes a heavy debt, in that he first discovered the astronomical enthusiasm and ability of F. G. W. Struve and secured his appointment as professor of astronomy in 1813. Meteorology also owes an equal debt to Parrot, who was one of the most learned members of the University of Dorpat during the years 1802-26; his influence was felt in every branch of science as well as in the administrative affairs of the University. His son, F. R. Parrot, succeeded him as professor of physics during the years 1827-40, and he in turn was succeeded by Prof. L. Kämtz in 1841. In 1865 Kämtz was called to St. Petersburg, and was in turn succeeded by A. von Oettingen, who, in 1891, removed to Leipsic.

Karl Ernst von Baer was born on his paternal estate Piep in Esthonia on February 5/17, 1792. He became professor in the University at Königsberg, but in 1830 removed to St. Petersburg as a member of the Academy of Sciences. In 1866 he resigned the latter position and settled at Dorpat where he died November 16/28, 1876. Von Baer's principal works related to the geology, geography, and climate of Russia, including articles on the climates of Sitka, New Zealand, and Siberia.

Besides these, Dorpat has given to meteorology A. Wiszniewski, whose thesis for the degree of A. M. in physics in 1853, dwelt on the mean annual temperature of the earth's surface as a function of the latitude and longitude, with a chart of isotherms for the whole globe. Among other celebrated names are those of Lenz, Kämtz, and Kupffer all of whom, following in the footsteps of the elder Parrot, prepared the way for the establishment of the meteorological system of the present Central Observatory.

Emil Lenz was born February 24 (O. S. February 12), 1804, in Dorpat. At the University his interest in the physical sciences was excited through the influence of the elder Parrot, and by him he was recommended as meteorologist and physicist to the exploring voyage of Kotzebue, although he was at that time only nineteen years old. The expedition left Cronstadt in July, 1823, reaching Kamschatka in June, 1824, and Sitka in August, 1824. After visiting California

and the Sandwich Islands the expedition returned to Kronstadt, July 22 (O. S. July 10). During this voyage of three years Lenz maintain continuous studies and observations in meteorology and the physics of the ocean. After his return he lived at St. Petersburg. In 1828 he became an adjunct member of the Academy of Sciences, and in 1834 a full member. In 1829 he carried out an extensive expedition to the Caucasus in connection with Kupffer. In 1835 he became professor of physics and physical geography at the University of St. Petersburg. His text-books on these subjects were highly esteemed. His contributions to science are mostly to be found in the memoirs of the Academy. He died at Rome, February 10, 1865 (O. S. January 29), while traveling abroad for his health.

Adolph Kupffer was born at Mittau in 1798. After studying at Dorpat he went to Berlin, Göttingen, and Paris and was then called back to the University at Kasan, having already become known by his publications relative to crystallography. In 1828 he was called to St. Petersburg as an associate of the Academy of Sciences, and in 1840 was appointed to the vacancy made by the death of Parrot. Up to this time Kupffer's work had been largely in connection with mineralogy, but he now began to apply his knowledge to the development of the whole subject of meteorology, magnetism, and the physics of the globe, and to the establishment of a department of standard weights and measures for the Russian Empire, so that he fully realized our ideal of a scientific investigator who understood the practical application of knowledge to the needs of the country. He organized a broad system of meteorological and magnetic stations for the investigation of the climate of Russia and the physical and geographical problems connected therewith. He was professor of physics in the Institute of Mining Engineers as well as in other educational establishments in St. Petersburg. Numerous journeys were necessary throughout Russia and southern Europe in connection with the establishment of his stations and their subsequent inspection. He also took an active part in the conference of 1863 in England for the establishment of an international system of weights and measures. He died in 1865, June 5 (O. S. May 23), at St. Petersburg.

One of the most active workers in meteorology and one who held a position that gave him much influence at St. Petersburg was, however, not from the Baltic Provinces but from the interior of Russia.

Constantine Vessellofski (or Wesselovski if we adopt the German spelling) was born in the town of Novomoskovsk in the Province of Jekaterinoslaff in southern Russia, on May 8/20, 1819. He devoted his life to the interests of the Academy of Sciences, and was its permanent secretary from about 1853 to about 1890. His scientific works relate principally to the geography and climate of the Russian Empire. He finally summed up nearly all that was known on this subject in two great volumes, published in Russian, entitled *O Klimate Rossia*, St. Petersburg, 1857.

In recent years central and southern Russia have given to meteorology other eminent men, such as Rykatcheff, Köppen, Woeikoff, and Klossoffsky. Something has also been done for meteorology by the Imperial Society of Naturalists at Moscow.

Kupffer was the founder, first director and organizer of the meteorological system of Russia, which he at first conducted under the auspices of the Institute of Mining Engineers. The first volume entitled: *Observations Météorologiques et Magnétiques, faites dans l'Empire de Russie, rédigées et publiées aux frais du Gouvernement, par A. T. Kupffer, Membre de l'Académie des Sciences de St. Pétersbourg*. Tome I—was published at St. Petersburg in 1837. This volume appeared in two parts, and was intended to be a periodical publication; but before the third part could be printed, Kupffer states that

it had attracted the attention of the Emperor, who ordered that it should thereafter appear as an annual volume under the title: *Annuaire Magnétique et Météorologique du Corps des Ingénieurs des Mines de Russie*, etc. The first volume of the *Annuaire* was for 1837 and was published in 1839. Under this title successive annual volumes appeared up to that for 1846, which was published in 1849. In the meantime, the Emperor had established The Central Physical Observatory at St. Petersburg, as a common center of all that is done in Russia for terrestrial magnetism and meteorology, offering moreover everything necessary for making researches in every branch of physics. Kupffer states that this imposed upon him the necessity of enlarging the *Annuaire*, which thereafter appeared under the title *Annales de l'Observatoire Physique Centrale*. Beginning with the volume for 1847, which appeared in 1850, the *Annales* were published by Kupffer up to the time of his death, June, 1865. Thereupon, Professor Kämtz was called from Dorpat, but only one volume was published by him before he also died; the volume for 1864, although bearing Kupffer's name, was edited by Kämtz and published in 1866. Three years elapsed before the volume for 1865 was published in 1869, and it bears, as the author's name, H. Wild, the newly appointed member of the academy and director of the observatory.

Ludwig F. Kämtz was born January 11, 1801, at Treptow, Pomerania. In 1819 he entered the University of Halle where he studied mathematics under Pfaff, and especially devoted himself to mathematical and experimental physics. In 1827 he was appointed professor at this university. The physics of the atmosphere especially interested him, and as a summary of his many lectures on the subject he published, in 1827, 1832, 1836, the three volumes of his classical *Lehrbuch der Meteorologie*, which for many years held the highest rank, and will always be worthy of being consulted. In 1841 he was called to the University of Dorpat as professor of physics, where, among other things, he began the publication of his *Repertorium für Meteorologie*. He made many scientific journeys throughout Russia and especially the Alps. In 1865 he was chosen a member of the Academy at St. Petersburg and Director of the Central Physical Observatory, as the successor of Kupffer. Here he began a thorough reorganization of the climatological work and the meteorological stations, but his labors in this direction were unexpectedly brought to an end by his death after a short sickness at St. Petersburg, December 8/20, 1867. Lieutenant Rykatcheff, who began working with him in 1866, published at that time some interesting reminiscences in the journal of the Austrian Meteorological Society, April, 1868, illustrating the cheerful, happy, and kindly spirit of his illustrious master. The Editor had the privilege of a short acquaintance with Kämtz in 1865-66, and can also bear testimony to his great kindness toward the young students of science.

The successor of Kämtz, Heinrich Wild, was born at Zurich, December 17, 1833. He studied at the University of Königsberg where he took the degree of Ph. D. about 1856. He was appointed lecturer and, in 1862, professor of physics at the University of Bern, where he also succeeded Rudolf Wolf as director of the observatory of the university. As it was difficult to do much astronomical work in the latter, Wild confined his attention to terrestrial physics, and was very active in connection with the reformation of the standards of measurement as well as every problem bearing on meteorological apparatus and methods. Under his successor, Dr. A. Forster, this observatory was rebuilt in 1876, and is now known as the Telluric Observatory of the University. In 1868, Wild was called from Bern to St. Petersburg as director of the Central Physical Observatory, leaving Bern in August of that year. His colleague, Prof. Aimé Forster, received and still retains his position at Bern. Wild's activity at St. Peters-

burg was as intense as in his early days at Bern. Finally, in July, 1895, he obtained permanent leave of absence on account of his health, and is now living quietly at Zurich, but still remains an honorary member of the Academy of Sciences at St. Petersburg.

Wild's first step was to request the appointment of a committee of the academicians to confer together as to the reorganization of the Central Physical Observatory. The report of this committee on November 14-26, 1868, expressed the need of the great improvements that he proceeded to inaugurate, such as the establishment of a new observatory for the purpose of investigation, at Pavlosk, the introduction of the metric system, the issuance of new instructions, and the publication of a separate system of memoirs entitled the *Repertorium für Meteorologie*.

The last volumes of the *Annales*, those for 1865-69, published in the years 1869-71, were edited by Wild, who states that, as far as practicable, the volumes conform to their predecessors.

With the volume for the year 1870 begins the series published by Wild under the title *Annalen des Physikalischen Observatoriums*. In the introduction to this volume Wild says:

With the year 1870 meteorological observations in the Russian Empire enter upon a new stage, in that on the 1st of January they begin to be made and reduced according to the new instructions for meteorological stations that I have drawn up with the approbation of the Academy of Sciences.

These instructions were published in the first volume of the *Repertorium für Meteorologie*, St. Petersburg, 1870, with some supplementary matter in the second volume. The volumes of the *Annalen* continued regularly, and that for 1894, published by Wild in 1895, was followed immediately by that for 1895, published by his successor, Rykatcheff, in 1896.

During Wild's administration a great impetus was given to all meteorological and magnetic work by the high character of the assistants whom he drew to him. By establishing his publication entitled *Repertorium*, which may be looked upon as the successor of the *Repertorium* started by Kämtz at Dorpat, Wild gave his assistants an appropriate place for the publication of their work, and created a standard of excellence that has never been surpassed and scarcely attained in any part of the world. The Astronomical Observatory at Pulkova and the Physical Observatory at Pavlosk, about 3 miles distant toward the southeast, on the great road to Moscow, shine as intellectual beacon lights for the guidance of students.

The memoirs in Wild's *Repertorium* were published in the languages chosen by the respective authors. French and German, Russian, English and Latin were equally acceptable. The first volume fulfilled a pious duty to his predecessor, Kämtz, by publishing several unfinished memoirs by that distinguished scientist, each of them being completed and edited by Wild's assistants, Koeppen, Rykatcheff, and Perret. Independent memoirs by Koeppen, Fritzsche, Woeikoff, Kiefer, and Wild himself complete the volume. The high esteem in which Kämtz was held is expressed by all of those who had been his pupils and assistants. Their intercourse with this learned man could never be forgotten. Koeppen says he was lamented by all who had the interests of science at heart. Among the assistants the reader will notice the name of M. Rykatcheff, who at that time was a lieutenant in the Russian Navy; in 1866 he had been assigned to duty under Kämtz, his first work being the study of the new method devised by Kämtz for determining the dip of the magnetic needle. The first few pages of Rykatcheff's memoir on this subject contain the last scientific writing of Kämtz, describing the magnetic work done by him in the summer of 1867.

Rykatcheff continued to be attached to the Central Obser-

vatory until the end of Wild's administration having for many years been the chief of the division of maritime meteorology and storm warnings. His position in the navy was also raised steadily by promotion until his appointment, in 1895, to succeed Wild as Director of the Central Physical Observatory and member of the Imperial Academy of Sciences. He now has the rank of major-general.

The appointment of Rykatcheff as Director of the Observatory, July 20, 1895, also marks a general change in the spirit of the administration of affairs in Russia where the so-called Russian element is now predominant. During the past two centuries the Russian czars have frequently called foreigners to St. Petersburg to superintend the development of scientific and practical works, but at the present time the tendency is to rely upon the old Russian families. The *Repertorium*, maintained by the Imperial Academy of Sciences as a medium for the publication of matters bearing especially on the work of the Central Observatory, is now discontinued, and the memoirs appropriate to it will hereafter be published either in the quarto memoirs or the octavo bulletins of the physical section of the Academy of Sciences. The observations, properly so-called, consisting entirely of numerical tables, will continue to be published in a separate volume but under the former title of *Annales de l'Observatoire Physique Centrale*.

We should not close this sketch of Russian Meteorology without mentioning one who has done so much to make Russia well known to the rest of the world. Prof. Dr. Georg Adolph Erman was born in Berlin, May 12, 1806, and died in that city July 12, 1877. He was the son of the equally distinguished Paul Erman. In 1828-1830 Adolph Erman joined the Norwegian expedition to Siberia, which he afterwards extended to a tour around the world. His scientific work on this occasion embraced every branch of science, but especially magnetism and meteorology and the results were published in seven volumes, generally known as *Erman's Reise um die Welt*. His intense activity on this occasion brought forth new ideas too numerous to mention and threw a flood of light upon our knowledge of meteorology and magnetism. He had received the degree of doctor of philosophy at the Berlin University in 1826 and was now made professor-extraordinary in 1839. The rest of his life was devoted principally to terrestrial physics, especially magnetism, meteorology, seismology, and meteors; but the greatest work that he undertook was his *Archiv für Wissenschaftliche Kunde von Russland*, which began in 1841 and has been carried on by others since 1856. In this periodical one may find translations and summaries of all the great works either by Russians or by others exploring in Russia, together with the results of his own work. Erman's general numerical comparison between the Gaussian Theory of terrestrial magnetism and the results of actual observations was one of his heaviest pieces of mathematical and numerical work. One of his last publications, however, is of special interest to meteorologists. It is entitled: *Ueber den permanenten oder mittleren Zustand der Erdatmosphäre*, and is published in the *Astronomische Nachrichten* for February, 1868. Herein he states that ever since his journey through Siberia he has demonstrated and maintained that the atmospheric pressure at sea level is not the same all over the globe, and he now proceeds to give the necessary formulæ in hydrodynamics explaining why this unequal distribution of pressure exists. His memoir on this subject takes special account of the resistance to the motion of the atmosphere by the surface of the earth and by the convection currents in the air. It, therefore, occupies a different field from the work published in 1859 by Ferrel, and may be considered as supplementary thereto; Ferrel considered the influence of density of the air as determining its motion, but

left the influence of friction to be found from observations. Erman deduces this latter influence analytically.

THE DAILY WEATHER MAP FOR MEXICO.

A great addition has lately been made to our knowledge of the meteorology of North America by the publication of the daily weather map for the Republic of Mexico, the issue of which began March 1, 1899. The map is about 12 inches high by 16 broad, and enables one to make immediate connection with the daily map of the United States and Canada. The observations are made simultaneously at 8 a. m., on the seventy-fifth meridian or 6:23 a. m., local mean time of the City of Mexico. Barometric pressures are reduced to sea level, but apparently not to standard gravity. The temperatures are surface observations and not reduced to sea level. The metric system is used. The observations are made by the officials of the federal telegraph system, whose director general, Senor Chaves, with the assistance of Senator Bárcena has finally succeeded in accomplishing this great work under the general direction of the Secretary of the Department of Roads and Public Works. A sample map is reproduced on Chart XI of the present REVIEW. The reader will easily convert the isobars and isotherms into English equivalents by the following small table:

| Pressure. | | Temperature. | |
|--------------|---------|--------------|------|
| Millimeters. | Inches. | C. | F. |
| | | ° | ° |
| 740.0 | 29.13 | -40 | -40 |
| 742.5 | 29.23 | -35 | -31 |
| 745.0 | 29.33 | -30 | -22 |
| 747.5 | 29.43 | -25 | -13 |
| 750.0 | 29.53 | -20 | -4 |
| 752.5 | 29.63 | -15 | +5 |
| 755.0 | 29.73 | -10 | +14 |
| 757.5 | 29.82 | -5 | +23 |
| 760.0 | 29.92 | 0 | +32 |
| 762.5 | 30.02 | +5 | +41 |
| 765.0 | 30.12 | +10 | +50 |
| 767.5 | 30.22 | +15 | +59 |
| 770.0 | 30.32 | +20 | +68 |
| 772.5 | 30.41 | +25 | +77 |
| 775.0 | 30.51 | +30 | +86 |
| 777.5 | 30.61 | +35 | +95 |
| 780.0 | 30.71 | +40 | +104 |
| 782.5 | 30.81 | | |
| 785.0 | 30.90 | | |

This map appears as an annex to the Boletín Telegrafico, published by the Department of Federal Telegraphs. The first number of the Boletín and map is dated March 1. The text of the Boletín seems to be confined to statistical data, relative to imports and exports, but we copy the following remarks from the first number.

THE UTILITY OF THE WEATHER MAP. (Translated from the Boletín Telegrafico of March 1, 1899.)

The meteorological phenomena of any locality are not isolated and independent; they are not even complete phenomena but are parts of one that started far away, and which, in its subsequent development, assumed various aspects and traversed hundreds and thousands of kilometers. A single city or a limited region sees only one phase of the whole phenomenon.

Hence the necessity for comparing the meteorological records collected in various localities. In order to obtain such data, the Central Meteorological Observatory requested from the telegraph companies of the federal system, simultaneous observations of weather conditions.

These observations were, however, deficient and imperfect, and of very little use to the Observatory on account of the inaccuracy which such observations necessarily possess when based upon the appreciation of each individual and not upon the readings of appropriate instruments.

The Director of the Federal Telegraphs desirous, through his service, of assisting the Observatory with more accurate and incomparably more useful records, distributed among 35 telegraph offices the instruments necessary for obtaining the data relative to pressure, temperature, humidity of the air, direction and force of the wind, taking care that these 35 offices should be at appropriate distances one from the other and properly distributed throughout the vast territory of the Republic. We should also state that in addition to the 35 federal stations four other private stations have also given us their cooperation; their assistance is much appreciated and gratefully acknowledged by the Director and their work will receive the publicity it merits.

The weather map, which is published in the Republic for the first time to-day, shows the weather conditions at the same moment over the whole country.

For the past six months, the observations, as recorded by the instruments, have been transmitted every day by telegraph, and the Central Office reduces and computes them by means of numerical tables properly prepared, in order to trace the curves of full and dotted lines, which show on the map the points all over the country where the pressures and temperatures respectively are the same. The pressures are drawn for every 2½ millimeters, and the temperatures for every 5 degrees. Of course, the regions between two isobars and two consecutive isotherms are comprised between the numbers represented by the said lines.

These lines are continuations of those of the United States and can be followed on the maps of that country. It was in order to form as it were one service that the Government of Mexico organized its own service on the same system as that adopted in the United States, and both countries make a daily exchange of their respective observations.

As regards the public, the principal object of a meteorological service like the one inaugurated to-day, is the prediction of the weather; such predictions are not possible except with a very long series of observations, and by taking all the precautions which the complexity of the atmospheric phenomena demand. These phenomena are the more complex in proportion as the region where they are observed is exceptional, as is the case in our country.

The record above referred to will aid the telegraph service in making more accurate predictions than it has yet ventured on, if only for the purpose of warning the inspectors of the damage likely to be done along the line of danger, and by causing the officials charged with the care of the lines, to take the necessary precautions in time, in order to foresee or to repair the damage often done by thunderstorms, particularly along the coast. Such precautions were adopted with good results on the occasion of the last thunderstorm.

Besides this, the telegraph service also derives from the simultaneous meteorological service, extending over large sections of country, the great advantage of acquiring a better knowledge of the conductivity and insulation of the telegraph wires. All of these direct benefits to the telegraph service contribute indirectly to the public good by conducing to a better telegraphic service than exists at present. In addition to this, there is also a great and direct advantage to be derived by the agriculturist, navigator, or who would undertake to collect, study, and analyze the maps and make his own predictions. Be this, however, as it may, the essential feature is in the official meteorological service itself, which affords the basis for the prediction of the weather. Such predictions will also be attained in the course of time.

JOHN H. HARMON.

Announcement is made of the death at Washington, D. C., on March 29, 1899, of Mr. John H. Harmon, of the Central